

REMARKS

This paper is being presented in response to an official action dated February 28, 2001, wherein: (a) claims 1-17 are pending; (b) claim 9 has been rejected under 35 U.S.C. § 112, ¶ 2; (c) claims 1-9 and 12 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Allen et al. EP 534,102; (d) claims 13 and 14 have been rejected under § 102(b) as being anticipated by Hackleman U.S. Patent No. 5,734,394; (e) claims 10 and 11 have been rejected § 103(a) as being obvious over the Allen patent in view of Drake EP 512,799; and (f) claims 15-17 have been rejected under § 103(a) as being obvious over the Hackleman patent in view of Silverbrook U.S. Patent No. 6,171,875. Reconsideration and withdrawal of the rejections are requested.

This paper is timely-filed, as it is accompanied by a petition for a one-month extension of time, and the required extension fee.

The specification has been amended to include headings, and is believed to be in compliance with the preferred layout and content for patent applications as suggested at pages 2 and 3 of the official action.

Claim 1 has been amended to correct an inadvertent typographical error. Claim 9 has been amended to delete the word “preferably” therefrom.

Attached hereto (at page 9) is a sheet showing the changes made to the specification and claims by this amendment. The attached sheet is captioned “**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**”

I. The 35 U.S.C. § 112, ¶ 2 Rejection

According to the official action, claims 9 has been rejected under 35 U.S.C. § 112, ¶ 2. In view of the amendment to claim 9, reconsideration and withdrawal of the rejection are respectfully requested.

II. The Rejections Under 35 U.S.C. § 102(b) Are Traversed

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Additionally, “[t]he identical invention must be shown in as complete detail as is contained in the patent claim.” *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

A. The Rejection of Claims 1-9 and 12 is Traversed

Claims 1-9 and 12 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Allen et al. EP 534,102. In view of the arguments presented below, reconsideration and withdrawal of the rejection are requested.

As amended, claim 1 recites "conduit means for conveying droplet fluid to and from said fluid chamber, said drive circuit means being in substantial thermal contact with said conduit means so as to transfer a substantial part of the heat generated in said drive circuit to said droplet fluid." Thus, the claim recites an arrangement in which heat generated in the drive circuit is transferred to fluid conveyed by conduit means which conveys fluid towards and away from the fluid chamber, thereby enabling the generated heat to be quickly carried away from both the drive circuit and the fluid chamber. This can minimize any variation in the temperature of the fluid in the chamber; any such temperature variation can give rise to variations in droplet ejection velocity and consequent dot placement errors in the printed image.

Figure 5 of the Allen patent shows a printhead which includes a reservoir 12 from which ink is fed to a vaporization chamber associated with each of the orifice holes 16 formed in a nozzle member 18. Silicon dies 56 are positioned in the back of the nozzle member. Ink flows from the reservoir 12, through a filter screen 66, then through slots 36 and 38 between support columns 62 and around the edges of the silicon dies 56. The ink then enters a vaporization chamber formed on the back of the nozzle member, each chamber being associated with a heating resistor formed in the silicon die which receives electrical signals from a conductor when ink is to be ejected from the chamber.

Allen does not disclose or otherwise suggest any means for conveying fluid to and from a vaporization chamber, and thus does not disclose or otherwise suggest at the transference of any heat generated during operation of the printhead to fluid conveyed by any such conduit means. Thus, unlike the present invention, the printhead of Allen does not provide efficient conveyance of heat away from the vaporization chamber. Consequently, because the Allen patent does not disclose each and every element as set forth in the claims 1-5, the Allen patent does not anticipate those claims.

Regarding claims 6-10 and 12, there is no suggestion in Allen of transferring heat generated during droplet ejection to the ink contained in the reservoir. The Allen patent states at column 4, lines 30 to 33, that the printhead includes "an ink reservoir 12 containing one or more pieces of foam in which liquid ink of one or more colours is stored." The ink

reservoir 12 disclosed in the Allen patent is therefore “static,” in that the foam would prevent the free flow of ink in a direction substantially parallel to the row of orifices formed in the nozzle member. Thus, the Allen patent does not disclose or otherwise suggest any “fluid passageway communicating with said plurality of fluid chambers and arranged so as to convey droplet fluid to or from said fluid chambers in a direction substantially parallel to said nozzle row.” Consequently, because the Allen patent does not disclose each and every element as set forth in claims 6-10 and 12, the Allen patent does not anticipate those claims.

B. The Rejection of Claims 13 and 14 is Traversed

Claims 13 and 14 have been rejected under § 102(b) as being anticipated by Hackleman U.S. Patent No. 5,734,394. In view of the arguments presented below, reconsideration and withdrawal of the rejection are requested.

Claim 13 recites that the required support member has a coefficient of thermal expansion that is greater than that of the fluid chamber. In contrast, the Hackleman patent discloses an arrangement in which, using the language of claim 13, it is the fluid chamber which has the higher coefficient of thermal expansion. the printhead disclosed in the Hackleman patent is formed from a flexible printed circuit, or flex circuit 26 (which corresponds to the fluid chamber of Claim 13) attached to a printbar 24 (which corresponds to the support member of Claim 13). The Hackleman patent states at column 2, lines 37 to 39, that “thermal expansion and contraction of the flex circuit cause displacements relative to the underlying printbar along known paths.” Furthermore, the Hackleman patent states at column 2, line 66 to column 3 line 4, that

the flex circuit defines a plurality of slots. When attaching the flex circuit to the printbar, a fixture is received in each slot. Each slot has a prescribed orientation allowing thermal displacements of the flex circuit relative to the fixture and printbar in the direction of the slot.

Still further, the Hackleman patent states at column 3 lines 33 to 43, that

a reference barrier on the printbar forms two edges or a corner adjacent to the flex circuit. The reference barrier defines a 2-D connection between the flex circuit and printbar in the xy-plane. Such reference barrier confines flex circuit displacement in the xy-plane to occur away from the barrier. Thus, the barrier serves as a bench mark for the printhead. All expansion or contraction of the flex circuit occurs relative to the bench mark. Because the

flex circuit cannot move beyond the barrier, the flex circuit edges remain fixed and thermal expansion occurs away from the barrier.

The foregoing passages in the Hackleman patent make clear that it is the flex circuit that has the higher coefficient of thermal expansion, not the printbar. This is completely opposite to the arrangement specified in claim 13. Consequently, because the Hackleman patent does not disclose each and every element as set forth in claims 13 and 14, the Hackleman patent does not anticipate those claims or claims dependent therefrom.

III. The Rejections Under 35 U.S.C. § 103(a) Are Traversed

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of a plurality of references. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on the applicants' own disclosure. *In re Vaeck*, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

The examiner bears the burden of establishing a *prima facie* case of obviousness and "can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). To support a conclusion that a claimed combination is obvious, either: (a) the references must expressly or impliedly suggest the claimed combination to one of ordinary skill in the art, or (b) the examiner must present a convincing line of reasoning as to why a person of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972, 973 (Bd. Pat. App. & Inter. 1985).

A. The Rejection of Claims 10 and 11 is Traversed

Claims 10 and 11 have been rejected under 35 U.S.C. § 103(a) as being obvious over the Allen patent in view of Drake EP 512,799. Reconsideration and withdrawal of the rejection are requested.

Claims 10 and 11 are dependent from independent claim 6. As set forth above, in Part II.A of this paper, the Allen patent does not disclose or teach transferring heat generated during droplet ejection to the ink contained in the reservoir. Furthermore, the Allen patent does not disclose or otherwise suggest any "fluid passageway communicating with said plurality of fluid chambers and arranged so as to convey droplet fluid to or from said fluid chambers in a direction substantially parallel to said nozzle row." These deficiencies are not remedied by the Drake patent. Thus, because not all of the limitations of independent claim 6 are found in the Allen patent and Drake patent, no *prima facie* case of obviousness has been made and, consequently, dependent claims 10 and 11 are not obvious.

B. The Rejection of claims 15-17 is Traversed

Claims 15-17 have been rejected under § 103(a) as being obvious over the Hackleman patent in view of Silverbrook U.S. Patent No. 6,171,875. Reconsideration and withdrawal of the rejection are requested.

Claims 15-17 are dependent upon independent claim 13. As set forth above, in Part II.A of this paper, the Hackleman patent discloses and teaches that the flex circuit has the higher coefficient of thermal expansion – not the printbar. As noted above, this is contrary to the arrangement recited in independent claim 13. This deficiency in the Hackleman patent is not remedied by the Silverbrook patent. Thus, because not all of the limitations of independent claim 13 are found in the Hackleman patent and Silverbrook patent, no *prima facie* case of obviousness has been made and, consequently, dependent claims 15-17 are not obvious.

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CONCLUSION

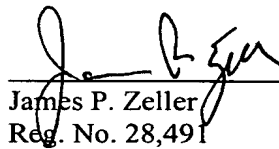
Should the examiner wish to discuss the foregoing, or any matter of form, in an effort to advance this application toward allowance, he is urged to telephone the undersigned at the indicated number.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

At page 1, following the title, please insert the following paragraphs:

Background of the Invention

Field of the Invention.

At page 1, line , please insert the following paragraph:

Description of the Related Art.

At page 1, line 15, please insert the following paragraph:

Summary of the Invention.

At page 5, line 12, please insert the following paragraph:

Brief Description of the Drawings.

At page 6, line 1, please insert the following paragraph:

Detailed Description of the Preferred Embodiments.

IN THE CLAIMS:

Please amend claims 1 and 9 as follows:

1. (Amended) Droplet deposition apparatus comprising:
a fluid chamber having actuator means actuatable by electrical signals to effect ejection of droplets from the fluid chamber;
drive circuit means for supplying the electrical signals to the actuator mans; and
conduit means for conveying droplet fluid to [or] and from said fluid chamber, said drive circuit means being in substantial thermal contact with said conduit means so as to transfer a substantial part of the heat generated in said drive circuit to said droplet fluid.

9. (Twice Amended) Apparatus according to Claim 6, wherein the cross-section of support member is [preferably] wider in the direction of ink ejection from the nozzles than in the direction of the nozzle row.